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A PERSPECTIVE ON THE FLORISTIC STUDIES IN THE SOUTH-EASTERN CORNER OF MADHYA PRADESH AND FUTURE NEEDS

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The area considered in this review of floristic study is the south-eastern part of the central Indian state of Madhya Pradesh, comprising the districts of Rajnandgaon, Durg, Raipur and Bastar, lying between latitude 17° 45′-22° 30′ N and longitude 80° 15′-83° 20′ E, with a total area of 79,981 sq. km. The average annual rainfall varies from 1200-1600 mm. Sheonath, Mahanadi and Indravati are the three main rivers, with several smaller ones criss-crossing the whole region. In general, the terrain presents a mixed picture of low rising hills and small stretches of plains in the south-western region, while the north-eastern region is a part of the Chhattisgarh plains. Bailadilla hills, the well known source of iron-ore in the central part of Bastar, has the highest peak, 1276 m above m. s. l. The vegetation is of tropical dry deciduous and tropical moist deciduous types. Phyto-geographically the area comes under the Deccan sub-region of India (Chatterjee, 1940).

Plant collections till the publication of J. D. Hooker's Flora of British India : In search of material available from this area to Hooker and his collaborators while writing the above Flora, the author went through several historical accounts (Clarke, 1898; Blatter, 1911; Haines, 1916; Mooney, 1942; Hewetson, 1951; Santapau, 1958 & Burkill, 1965) but could not find a single reference to any plant collection in this region. Clarke (1898) in his phyto-geographical division of British India, based on the distribution of the widespread family Cyperaceae, has, under each species, given an almost complete list of specimens on which the account of this family was based in Hooker's Flora (*l.c.*). Even here, not a single collection has been mentioned from any part of the region under consideration. It is improbable that if any plant collections were attempted, even on a modest scale, not a single Cyperaceae element could be gathered, and hence, it is further confirmed, that this, about 80,000 sq. km. of central Indian region, remained unrepresented in Hooker's Flora (*l.c.*).

Plant collections subsequent to the publication of J. D. Hooker's Flora of British India till India's independence : The botanical activity in the area appear to start with some collections of Watt (*c.* 1894) and Marten (*c.* 1900) in Raipur, and Lowrie (1908-09) in Raipur and Durg (incl. Rajnandgaon). However, the first major effort of botanising in the region is that of H. H. Haines. The places visited by him in Rajnandgaon, Durg and Raipur are indicated in his *Descriptive list of trees, shrubs and economic herbs of the Southern Circle, Central Provinces* (1916). Further, though his area included Bastar district also, Haines could not apparently get material from there, as a perusal of his distribution data under each species shows no localities from that district.

Hence, Mooney may be considered the pioneer botanist to explore in Bastar, collecting in the Bailadila hills. He undertook five trips of a few days duration, in March, 1936; August, '37; December, '38; July, '39 and October, '40. He published, in 1942, a list of 565 sp., also acknowledging therein the receipt of some sporadic collections of Crookshank in about 1938. Mooney continued his collections upto 1946 in Bastar.

Most of the collections of Haines are in herbaria abroad (A, ABC, BRSL, K, NY etc.), only some at DD & CAL. Those of Mooney are at K, DD & CAL.

Plant collections in the post-independence period : The realisation of this lacuna in the knowledge of the Indian flora led to the revival of the Botanical Survey of India. In 1955, the present region formed part of the area under the jurisdiction of its Southern Circle at Coimbatore. From there, K. Subramanvam, in November, 1958 (8 days) & August, '59 (12 days), and N. P. Balakrishnan in February, '61 (11 days) undertook tours to Bastar district. Simultaneously, S. K. Jain, from Central Botanical Laboratory, BSI, undertook five trips, in January, 1961; November, '61; April, '62; September, '62 & February-March, '63 to Bastar, and made some selective collections from the ethnobotanical point of view. All of them also made some casual collections from Raipur *enroute* to Bastar. Their collections are available at BSA, MH & CAL.

In July, 1962, the Central Circle of the Botanical Survey of India was established at Allahabad, and since then the present area came under its jurisdiction. From here, P. C. Pant collected from Rajnandgaon in April, 1974 (8 days); October, '74 (12 days); September, '76 (13 days) and August, '78 (5 days) and in Durg in April, '74 (6 days) and August, '78 (13 days). The author himself collected in Raipur in May-June, '72 (25 days); January, '76 (16 days); August, '76 (13 days) and October, '76 (13 days). G. Panigrahi in February, '63 (13 days), and C. R. Das in December-January, '71-'72 (18 days) collected in Bastar. All these collections are at BSA, with some duplicates at CAL.

R. M. Singhal, in September, 1951, collected in north Raipur (DD). H. O. Saxena, S. N. Khotele, Shukla, Singh, Pandey and Indorkar, all from State Forest Research Institute, Jabalpur appear to have made a sizeable collection in Bastar (SFRI), in different seasons between 1964-'71. Srivastava also collected in Bastar (LWG). Probably between December and 1963-August, '71, K. S. Unni collected in and around Raipur city (DD and Govt. Sc. College, Raipur). S. D. N. Tiwari (1948-onwards) has made collections, mainly in Bastar, and his specimens are all probably in his personal custody.

A perusal by the author of the publications and herbarium records show that probably due to communication and other difficulties, botanists have been obliged to treck and collect more or less along the same routes, and even with best efforts, large areas of dense forests have been left unexplored.

Concluding remarks on exploration, availability and utility of collections : It is now to be decided whether these areas can be considered as well explored, and the collections as sufficient to write up a Flora. Personal opinions would no doubt vary on this aspect. Normally, however, a reasonably good representative collection from all parts of the area, in different seasons, is expected for writing a Flora. For judging this any area has to be divided into smaller units. Consideration of a district as a unit for this purpose is unacceptable because of a great deal of variations in the sizes, terrain and botanical wealth. Thus, while six botanical trips in different seasons, each of about 20 days duration, may be sufficient for Durg or Rajnandgaon districts, the same cannot be considered as enough for the much larger district of Bastar, more so because of its more hilly terrain making the land area still larger than what it appears on the map, and its botanical wealth preserved in all nook and corners of the comparatively less disturbed and inaccessible forests. However, for convenience of reference, administrative units may be followed in publications.

Thus, each degree of latitude and longitude of the area under consideration was divided into four equal parts, yielding quadrangles of about 700 sq. km of land area (when it is more or less plain), to evaluate whether sufficient efforts have been made to gather all the plants from each of the unit so obtained. This method has the additional advantage of roughly pointing to the location for distributional analysis without the tedious process of searching the map for small places recorded on the herbarium sheets. An analysis of the exploration on the above pattern showed that about 35 out of about 110 quadrangles have not been visited at all, or scarcely touched upon. Even for others, collections have not been made in all seasons, and no botanist has tried to collect, or make a note of all the plants at regular intervals to give a better picture of distribution. Thus, it is obvious that much more exploration is desirable before writing a comprehensive Flora.

It is also needed to look into the utility from practical point of view, of the earlier collections of Haines, Mooney and others while writing a Flora today, even presuming that it would be possible to get together all their collections scattered in various herbaria of India, and abroad. The fact is indisputable that these collections would be welcomed by any botanist for checking the identity and distribution, some critical evaluations and as a guide to the location of some rare sp., besides probably a few other purposes. However, the need for much more field-data and a preference for closer study of live populations, or fresh collections, has been universally realised. Also, while giving locations of species today, it would be incongruous to depend too much on old collections. The tremendous rate of urbanisation of Rajnandgaon, Durg and Raipur, and the mining activities at Bailadila in Bastar, have been gradually affecting the flora of the region. Hence, there is no alternative to more exploration and collection for a proper knowledge of the present day flora, irrespective of the fact that, as the past experience and publications show, there may not be many undescribed taxa or even very interesting new records from phyto-geographical point of view.

Floristic publications : As pointed out earlier, this area of nearly 80,000 sq. km lacks a distinct manual for the identification of plants. The first and the only Flora with a fairly detailed account of some plants, that too only of its northern part, is the *Descriptive list of trees, shrubs and economic herbs of the Southern Circle, Central Provinces*, by Haines (1916). It includes about 350 sp. from Rajnandgaon, Durg and Raipur districts. Mooney's *Sketch of the Flora of the Bailadila range in Bastar State* (1942) listing 565 sp. is the first floristic account from Bastar district.

Later, a few lists of plants of Madhya Pradesh (Tiwari, 1954 a-c, 1955 a-b, 1963 a-b, 1964 a-b, 1965, 1976; Panigrahi, 1965 a-b, 1966 a-b, 1967; Ramlal, 1967; Shukla, 1967) included plants mainly from Bastar and a few from Raipur. Subramanyam (1966), Arora

(1968) and Saxena (1974, 1976) published species lists exclusively on Bastar or Bailadila hills. Tiwari (1954), Roy (1957), Jain (1963 a-e, 1964, 1965) published on ethnobotanical aspects. List of new records for Madhya Pradesh/India by Raizada (1949), Saxena (1972), Naithani (1976, 1977), include a few species from Bastar and Raipur. D. K. Tiwari (1960 a-b) and Unni (1967 a) published on aquatic flora of Raipur, and Unni (1967 b) on Compositae of Raipur. So far five new species have been published from this region (Haines, 1914, 1917; Narayanaswami, 1941, Raizada, 1947 and Henry, 1961). All these should assist in the preparation of a comprehensive Flora of this region.

Some present and future needs: Presently we are faced with the problem of incomplete exploration and the need of a Flora for the whole, or at least a part of this region. It would be ideal to try to complete the exploration first, but the time to explore, process and work out the collections, is likely o run into years. Meanwhile, the immediate need, or expectation, of a Flora also cannot be denied. Hence, it is advisable to consoli-late all the data so far gathered, and write Flora on the basis of the collections available n Indian herbaria at BSA, MH, DD, CAL, FRI, LWG, and Govt. Science College, Raipur. With this end in view, Botanical urvey of India proposes to write a Flora of Rajnandgaon, Durg and Raipur districts, and nother for Bastar district.

After publication of such a Flora, upcoming botanists could be entrusted with horough exploration. They may go to each uadrangle as suggested earlier, make a ecord of all the common elements in each uadrangle after checking their identity with he above Flora, and make a collection of omewhat less known or rare plants, or those hich they cannot identify. A selective collection is being recommended only to avoid overburdening the workers and quicken the results, though collection of all would be ideal. By going frequently, or by long stays, it would be possible for botanists to mix up more freely with the local people and record well checked first hand informations on local names, uses and abundance of individual species. In this way an younger generation of botanists would also get a very useful training, and those with better background would be spared for more serious taxonomic work. It is also hoped that once these floristic manuals are easily available, amateur botanists/college teachers and students/forest personnel would take a more active interest and contribute some valuable data. A comprehensive Flora can be expected only afterwards.

Thus, we would also know what plants are used in different places for a particular purpose. After laboratory analysis and trials, the most suitable species can be selected, and a programme can be evolved for its collection from the wilds or cultivation/improvement.

A plea may also be made here for the preservation of the forests, apart from other advantages, for the conservation of species in danger of extinction. It must be borne in mind that the arboreous elements are not the only ones in danger; changes in vegetation make some herbaceous elements equally susceptible, and the gradual disappearance of these herbaceous species is also likely to pass unnoticed. At present it could also be useful to prepare with the cooperation of the forest department/village authorities, a list of species that are known to be in constant use by the local populations and keep a watch that they are not being over-exploited.

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